Series 625 Alarm Annunciator

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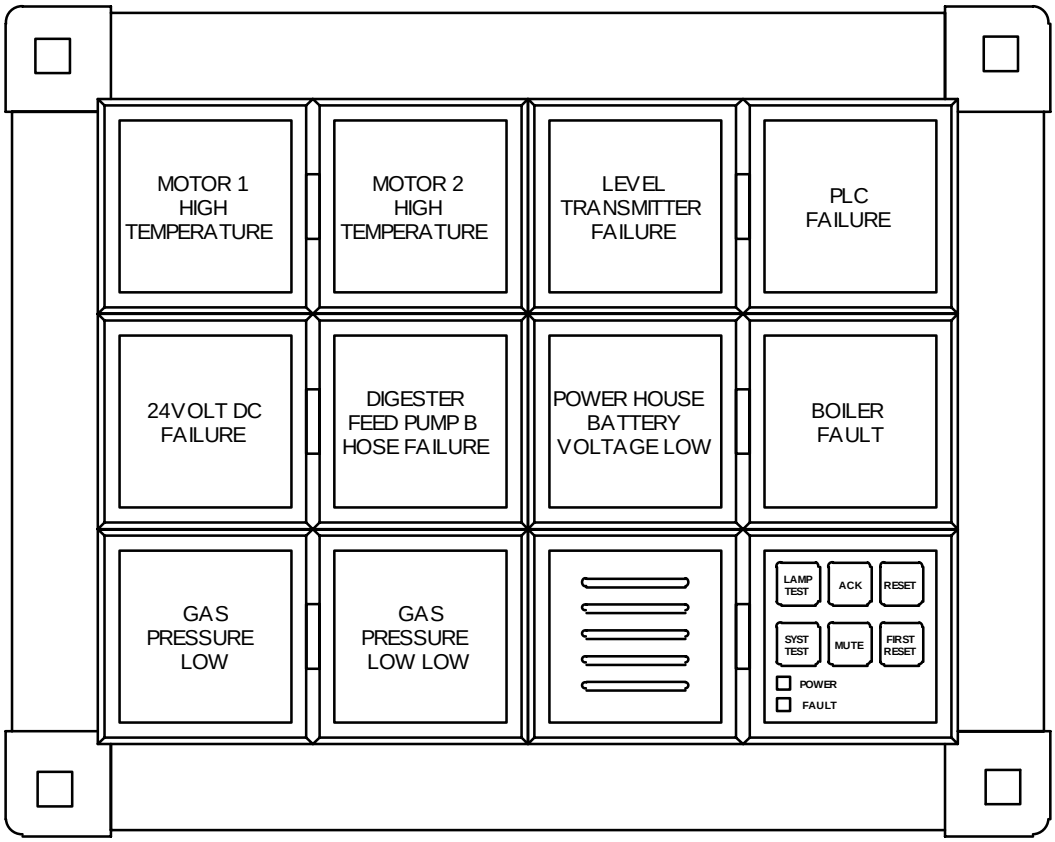


Example of a 12 way 625 Series Alarm Annunciator

1. Introduction

The RTK 625 Series Alarm Annunciator system is of modular construction and is designed to give indication of an alarm condition, or equipment status, where a high degree of reliability and flexibility is required.

Each module, comprising of two alarm ways, is of lightweight aluminium construction with a moulded plastic bezel. Modules are assembled within an attractive extruded aluminium 'picture frame' surround, which gives maximum annunciator density whilst maintaining a large legend area and neat front panel appearance.

A group of DIL switches, situated on the annunciator board, permit easy selection of all of the different annunciator sequences as listed in the ISA Publication "Annunciator Sequences and Specifications" S18.1 - 1979. This means that stocking requirements may be minimised, since all annunciator boards are interchangeable. As the system is fully field-programmable, the operating specification, of both alarm sequence and function, can be changed during commissioning, or at a later date after the equipment is installed. The modular construction means the alarm system may be expanded, reduced or rearranged at a later date with minimal effort and cost.

Reliability of operation is increased over conventional annunciators by the use of Application Specific Integrated Circuits (ASIC's). Each two way alarm board is fitted with one ASIC, which is capable of complete system control. When the annunciator is initially switched on, control is arbitrarily allocated to any one of the ASIC's on any of the alarm boards, hence the Annunciator requires no control or master module, failure of which could jeopardise the whole system. If the alarm board is removed or an ASIC goes faulty then control is randomly allocated to another ASIC on another alarm board, hence the worst fault that could normally occur is the loss of two alarm ways. The use of ASIC's also results in a very low component count, again improving system reliability.
A separate buffer integrated circuit is used to drive the higher power lamp, relay and horn drive outputs.

Annunciator system reliability is further increased by the use of a unique circuit which detects if a lamp has become short circuit, or both lamps have become open circuit. This circuit also protects the annunciator from damage by short circuit lamps. In both cases the annunciator drives an LED on the integral pushbutton module. Pressing the Lamp Test pushbutton then makes it obvious which lamp is faulty. Accessibility for servicing and lamp changing is excellent, being accomplished from the front of the panel without the use of special tools.

2. System Description and Features

General

Each annunciator is manufactured to meet individual customer's requirements. The units can be manufactured in almost any size and format. The only restriction is that there must be an even number of ways in the horizontal direction.

The annunciators are built up using standard lengths of aluminium extrusion and standard width back-panels to give a basic panel mounting framework. The alarm boards are fixed within the framework by chassis mounted headers, which are then wired together in a bus system to distribute all the common signals. The alarm boards are then pre-wired to a Terminal Board for external connection by the customer. The light box assembly is mounted over the alarm boards to make up the matrix arrangement.

Alarm Board

Each active alarm board controls two alarm points. Each alarm point has two lamps for increased reliability. The alarm board has an Application Specific Integrated Circuit (ASIC) which controls each pair of alarm ways. System control is arbitrarily allocated to one of the ASIC's on any one of the alarm boards, obviating the need for a master control module.
Each alarm board has an 8 way DIL switch and a 2 way DIL switch which are used to change the operating sequence of both the alarm ways on that board.

Reliable Annunciation

The fact that all the modules are identical means that in the RTK Series 625 alarm system there is no master or controlling module, failure of which could jeopardise the whole system. System control is arbitrarily allocated to any one of the alarm modules. Should this module be removed, damaged or fail for any reason, another module will take over system control. This method of operation results in a system with no single source of failure and multiple redundancy giving the most reliable form of annunciation possible.

Pushbutton/Audible module

The Pushbutton/Audible module is normally fitted in the bottom right of the annunciator and has 6 pushbuttons to cover all system functions and two LED's.
The six pushbuttons are the standard three, Lamp Test, Acknowledge and Reset and three further pushbuttons to give improved system flexibility. These are System Test, Mute (Horn Silence) and First-up Reset.
The two LED's are used to indicate "Power On" and "Fault". The upper green LED is marked "Power " and simply indicates that the 24Vdc supply to the unit is on. The lower red LED, marked "Fault", flashes to indicate a lamp fault. This will occur when an alarm window is unable to light its lamps. The system will detect a short circuit lamp under alarm conditions and when both lamps are open circuit whether in the alarm state or not. The fault LED will also illuminate when a pushbutton is pressed to indicate correct pushbutton operation and to give a warning when a pushbutton has failed in the closed position.

Pushbutton Failure

If a pushbutton should fail in the operated position, all alarms would be annunciated in the normal manner (although the pushbutton would have to be released to allow other pushbuttons to be used). A jammed Reset, Acknowledge or Mute (Horn Silence) pushbutton, for example, would not cause a new alarm to be ignored. The red "Fault" LED in the pushbutton module lights whenever a pushbutton is pressed so a jammed pushbutton would thus be indicated by this LED remaining on.

The Lamp Test pushbutton, if jammed in, would activate all the lamps - although new alarms would still activate the horn. This situation is not important since the Lamp Test condition would hardly go unnoticed.

Lamp Protection

Occasionally, lamp filaments fail in a short circuit mode causing excessive current to flow in the lamp driving circuit. The Series 625 Annunciator has a circuit which senses whether a lamp has turned on. If a lamp fails to turn on when it should do so, the lamp driving circuit protects itself by turning off and trying again later.

The module with the faulty lamp sends a signal back to the Pushbutton/Audible module to flash the LED in the Lamp Test pushbutton, indicating to the user that the lamps require testing to expose the faulty alarm way. This indication is given if either lamp should become short circuit or both lamps should become open circuit. Two lamps per annunciator window are used to give increased reliability.

First-up Alarms

When a group of alarms is initiated, it is often important to know which of them was the first to occur. Four different first-up sequences are available in the Series 625 Annunciator system as standard. The facility can be disabled if required by moving a jumper link (see Operating Instructions, Page 28). It is also possible to order the system with multiple first up groups within the same unit if required.

Standing Alarms

In many installations there are often alarms, of which the operators are aware, which remain in the alarm state for long periods. In any system employing a first-up sequence, a standing alarm would of course be the first-up. In the Series 625 Annunciator, a standing alarm may be unlatched from being the first-up by pressing the "First Reset" pushbutton. The display will now show a correct first-up when this standing alarm has been unlatched.

Serviceability

The Annunciator is a two-part construction consisting of a diffuser housing and a back panel to which the circuit boards are attached. The two are secured together with a plastic spring clip arrangement. When parted, the circuit boards and the lamps are exposed allowing simple replacement of these components.

The lamp drive, relay drive, horn drive and other outputs which interface with the outside world, and are therefore exposed to maltreatment, are all driven by one integrated circuit which can be easily changed in the event of IC damage.

No Service Tools Required

No tools are required to remove the bezel in order to replace faulty lamps, to remove the circuit board or make adjustments to the DIL switches.

3. Inputs and Outputs

Terminations and Interconnections

All connections to each 2 way alarm board are wired at the factory from a group of five male pins on each alarm module to one of three types of terminal board, the type being determined by the number and type of output relays required - (see Operating Instructions, Page 25). These terminal boards then present to the user rows of screw terminals for connection of the system to an installation.

Alarm board interconnections are by means of an eight wire bussed system which is used to supply power to the modules, synchronise the flashing lamps, ascertain the first-up alarm in any sequence, connect to the pushbutton controls and provide drive signals for both the integral audible device and a HORN relay. (This relay is used to drive larger external horns or sirens.)

Annunciator inputs

The standard Series 625 Annunciator operates from either normally open or normally closed volt-free contacts or voltage inputs. (Selection of contact type is by a DIL switch on the circuit board - see Page 29.)
Field contacts are often great distances from the Annunciator so it is advisable to run the contact cables separately from circuits carrying heavy currents and/or high voltages so as to minimise the effects of induced voltages from these cables. A transient filter is built into the input circuitry so that low voltage interference will be ignored. Contacts may be continuous or fleeting and provided the fleeting alarm exceeds 40 milliseconds duration, the Annunciator may be made to latch-on.

Opto-coupled inputs

All inputs from alarm contacts and external pushbuttons are opto-coupled. This method of operation improves the system's tolerance to noise interference and allows operation from voltage sources as standard.

Relay drive outputs

Relay drive outputs are used either individually or in a group to activate relays which in turn may be used to modify plant operation, operate signals, or operate protection devices etc. Relays may be either normally energised or normally de-energised and this option is selected by means of a DIL switch on the alarm board (see Operating Instructions, page 29).

The standard mode of operation for repeat relays is to latch in when an alarm condition occurs and only return to normal when the plant fault has returned to normal and the unit reset. Other relay operating modes are also available, such as relays following the input and relays following the lamp display.

Relay drive outputs are primarily intended for driving the relays fitted on the Input Terminal Board (see Page 26) and Relay Terminal Board (see Page 28). This board presents a low cost, high density method of mounting relays. Screw terminals permit connection to the relay contacts, each relay having a single changeover contact set available.

Group relays

It is often required that all alarm ways are commoned together to 1 or 2 group relays, to indicate to remote equipment or to a central control room that an alarm has occurred. The Series 625 features a variety of different group relay options sufficient to match most annunciation requirements.

The standard group relay option is where all alarm modules are commoned together and then connected to a single group relay. In this configuration, only the normally de-energised operation (energised for alarm) may be used. The relay outputs change state immediately an alarm is activated and remain in this state until the alarm annunciator is reset after all the faults have returned to normal.

Horn outputs

The horn outputs of individual modules are connected together by the cable bus. A solid-state audible device is mounted in the module with the pushbuttons and connected between the positive line and the cable bus. When any annunciator way is in the alarm state, the device emits a continuous sound until either the Mute (Horn Silence) or the Acknowledge pushbutton is pressed.

As standard, the Annunciator has a single horn relay connected to the cable bus. The contacts of this relay can be used to drive larger horns, sirens, klaxons, etc.
Systems can be supplied with two separate audible groups for critical and non-critical alarms. These annunciators will have two integral audibles with different tones and two horn relay outputs.

4. Mechanical Details

Module

This is the basic component of the Series 625 Alarm Annunciator system. This one module provides all common alarm sequences as listed in the ISA specification "Annunciator Sequences and Specifications" and obviates the need for a master module.

Each alarm module provides two alarm ways and comprises a moulded plastic bezel and light box assembly (which holds the engraved coloured diffuser/filter) and a 2 way alarm board. The circuit board plugs into connectors on a back plate, the size of plate being determined by the required system size and configuration. The lamps on the circuit board extend into the light box/bezel assembly. The front of the assembly is locked to the back plate by a peg which locates into a spring fastener attached to the back plate.

Pushbutton/audible module

This module is the same size, shape and fixing as an alarm module. This gives all the pushbuttons necessary for all the different operating sequences. The pushbuttons are lamp test, acknowledge, reset, mute, system test and first-up reset. The solid-state audible device is fitted in the switch module to the left of the switches. This module is normally fitted in the bottom right hand corner of the annunciator.

System assembly

Systems are normally supplied assembled ready to fit into the customer's panel cut-out. Back plates are cut to match system configuration (i.e. number of ways high x number of ways wide, allowing 2 ways for the switch module). The modules required (alarm ways divided by 2, plus switch module) are mounted onto the back plate. The appropriate interconnections, terminations and relays are added and a special 'picture frame' extrusion is bolted to the back plate.

System size/configuration

The recommended maximum panel size is 20 x 20 ways but larger systems may be supplied using two or more interconnected panels. The minimum size of panel when an Input Terminal Board is to be supplied is 1 vertical way by 2 horizontal ways (remember there are 2 ways per module). If a Relay Terminal Board is required, the minimum panel size is 2 vertical ways by 2 horizontal ways.

A system comprising 10 alarm ways and one Pushbutton/audible module (which equals 2 ways) could be arranged in a matrix 4 ways wide x 3 ways high. The same system could be supplied in a panel 2 ways wide x 6 ways high, 6 ways wide x 2 ways high or 12 wide x 1 high.

5. Sequences

SUMMARY

From the sequence tables shown on Page 13 to 16, it will be evident that an alarm occurring causes a flashing visual indication with audible and optional relay drive.
LAMP TEST may be operated at any time and operates only on the visual indication, turning all lamps on for as long as the pushbutton is pressed.
If requested at the time of ordering the lamp test facility can also operate the audible.
ACKNOWLEDGE stops the flashing and audible. If a new alarm occurs on an already acknowledged system, the horn will sound and the new alarm will flash.
RESET operates only if the visual is steady and plant conditions have returned to normal.
The relay drive is terminated only when the reset operates.
FIRST-UP RESET will unlatch the first-up alarm and convert this alarm to the same indication as a subsequent alarm, allowing any new alarm to become the new first-up.
MUTE is used only to silence the audible.

First-up sequence

When a group of alarms is initiated, it is often important to know which of them was the first to occur. This is achieved by having the first-up alarm flashing in a different manner compared to the subsequent alarms. Four different first-up sequences are available F0, F1, F2 and F3 as detailed below and in the following sequence tables. First-up operation should be used with care with the auto-reset sequence and non-latch sequence as momentary alarms can cause ambiguity. Dimback and ringback are readily used with a first-up sequence.

F0 The standard mode adopted by RTK Engineering, which indicates the first-up alarm by flashing at twice the rate of subsequent alarms.

F1 In this mode subsequent alarms appear in the acknowledged state, hence they do not flash. The audible device does not operate when subsequent alarms occur, unless still operating from the first alarm. The acknowledge pushbutton will reset the first-up indication.

F2 In this mode all subsequent alarms do not flash, they will however operate the audible device. The acknowledge pushbutton will reset the first-up indication.

F3 Additional types of flashing are added so that the first-up alarm can still be identified when the annunciator has been acknowledged. The acknowledge pushbutton does not reset the first-up indication so a separate first-up reset pushbutton is required. This pushbutton will reset the first-up whether the process condition has returned to normal or not.

Auto reset sequence

In this mode, the contacts returning to normal on an acknowledged alarm causes that alarm to reset. If the alarm contact returns to normal prior to being acknowledged, the alarm will reset immediately on Acknowledge.

Non-latch sequence (No lock-in)
Alarms will reset immediately when the contacts clear (i.e. the alarm is not latched), although whilst in the alarm state the Acknowledge, First-up Reset and Mute pushbuttons operate normally.

Reflash sequence
In the standard mode, when an alarm has occurred and has been acknowledged, any further changes of state of the alarm contact will not affect the alarm window display. With the reflash sequence selected whenever the alarm re-occurs on an acknowledged alarm way, the alarm is re-initialised, the window will flash and the horn will sound just as a new alarm.

Dimback sequence
A dimback sequence shows the status of the contacts by the display being dim or bright. Alarmed contacts give a bright display, whilst cleared contacts give a dim display thus:-

A flashing display with the alarm contacts in the alarm state flashes bright/dim, this becomes a flashing display of dim/off when the contacts return to plant normal condition.
An acknowledged display with alarm contacts in the alarm state is bright steady which becomes dim steady when the contacts clear.

Dimback operation may be used with all sequences except non-latched and although it may be used with Auto Reset it is of limited use since contacts returning to normal on acknowledged alarms reset automatically.

Ringback sequence
This mode is used to indicate to operators that the alarm contact has returned back to its normal state hence avoiding having to continually press the reset pushbutton, to see if the plant contacts have returned to their non alarm state.
When an alarm contact returns to normal the ringback facility will restart the audible, but at a very much slower rate, as shown in the following sequence tables. The visual indication for the window returning to normal will pulse in sync with the horn so it is noticeably different from a normal alarm.
Ringback operation may be used with all but non-latched and auto reset sequences and operates in the same way for all first-up sequences F0 to F3

Two button sequence
In certain circumstances using remote pushbuttons, it may be desirable to use only two pushbuttons: Reset and Lamp Test. The Reset pushbutton is used to Acknowledge an alarm if the contacts are in the alarm condition and to Reset it if the contacts are clear.

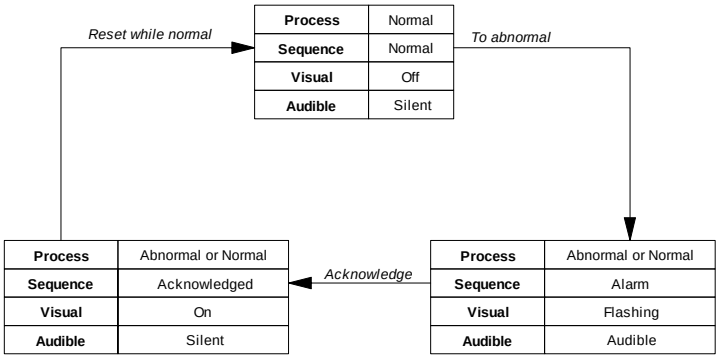
TO CHANGE FROM ONE SEQUENCE TO ANOTHER SEE THE DIL SWITCH SETTINGS SECTION, PAGE 29.

6. Sequence Tables

Example Sequence Tables

Each two way alarm board can be configured to suit the operating sequence required, as listed in the ISA publication "Annunciator sequences and specifications" S18.1 1979. Systems can be configured with different features on different alarm boards and there is no need to switch the power off.
32 different operating modes can be selected using the on board DIL switches. The following tables show the most commonly used examples.

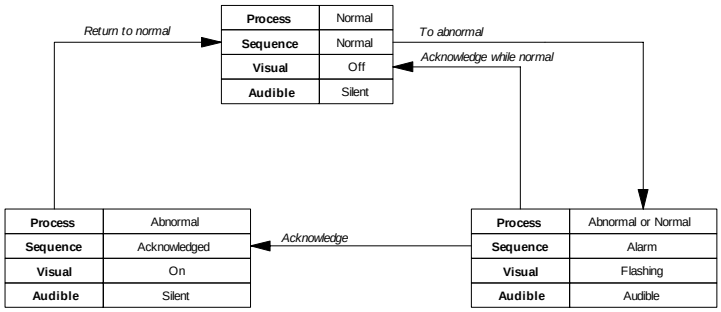
Manual Reset (Sequence M)



Sequence features

1 Acknowledge, reset and lamp test pushbuttons required
2 Alarm audible device
3 Lock-in of momentary alarms until acknowledged
4 The audible device is silenced and flashing stops when acknowledged
5 Manual reset of acknowledged alarms only after process conditions return to normal

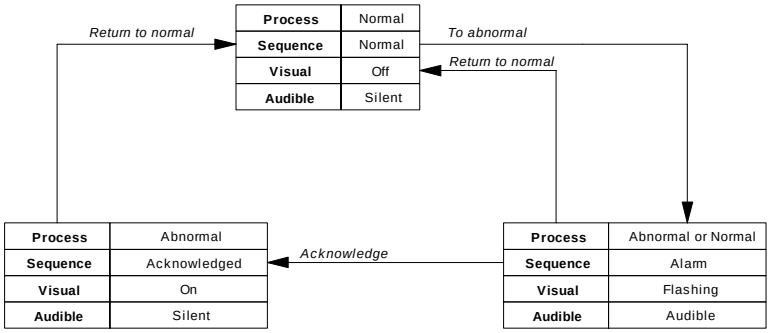
Auto Reset (Sequence A)



Sequence features

1 Acknowledge and lamp test pushbuttons required
2 Alarm audible device
3 Lock-in of momentary alarms until acknowledged
4 The audible device is silenced and flashing stops when acknowledged
5 Automatic reset of acknowledged alarms when process conditions return to normal

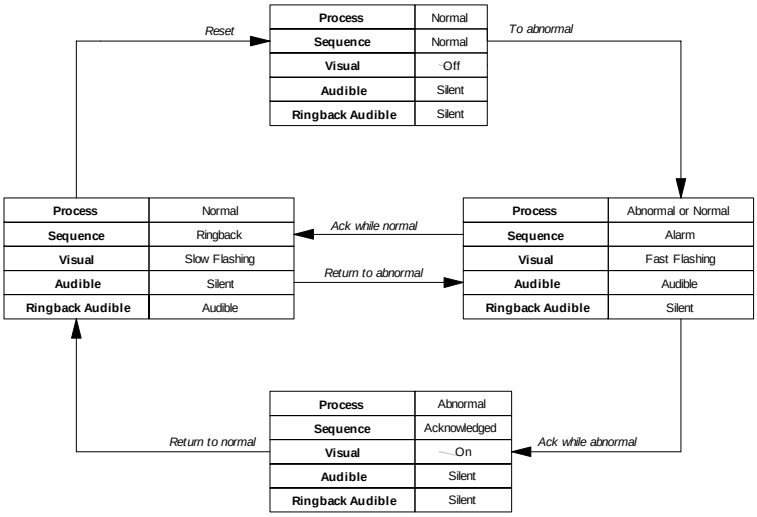
No Lock-in



Sequence features

1 Acknowledge and lamp test pushbuttons required
2 Alarm audible device
3 No lock-in of momentary alarms
4 The audible device is silenced and flashing stops when acknowledged
5 All alarms, acknowledged or not, return to normal when process conditions return to normal

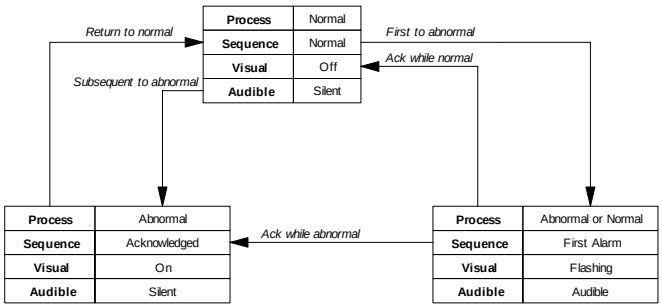
Ringback (Sequence R)
Only available in first-up modes F1, F2 and F3



Sequence features

1 Acknowledge, reset and lamp test pushbuttons required
2 Audible device, used for alarm and ringback
3 Lock-in of momentary first alarm until acknowledged
4 Ringback visual and audible indicates when process conditions return to normal
5 Manual reset of ringback indications

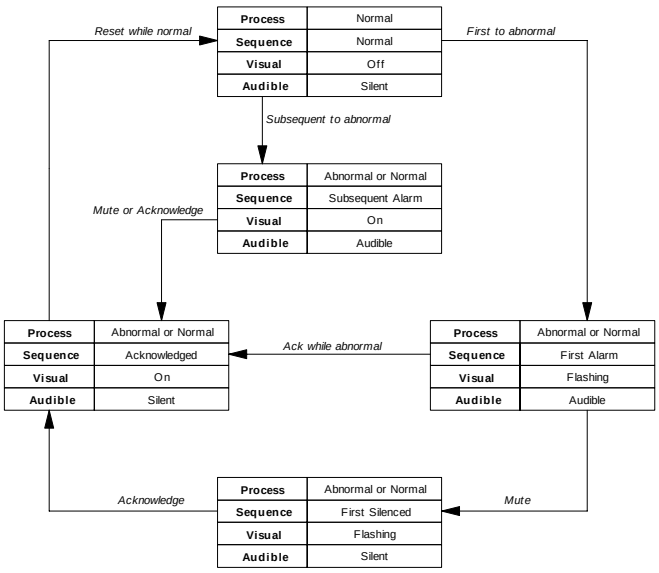
Automatic Reset First-up (Sequence F1A) with no subsequent alarm state



Sequence features

1 Acknowledge and lamp test pushbuttons required
2 Alarm audible device
3 Lock-in of momentary first alarm until acknowledged. No lock-in of momentary subsequent alarms
4 Flashing and audible indications for first alarm only. New subsequent alarms go to the acknowledged state
5 First-up indication is reset and the audible devices silenced when acknowledged
6 Automatic reset of acknowledged alarms when process conditions return to normal

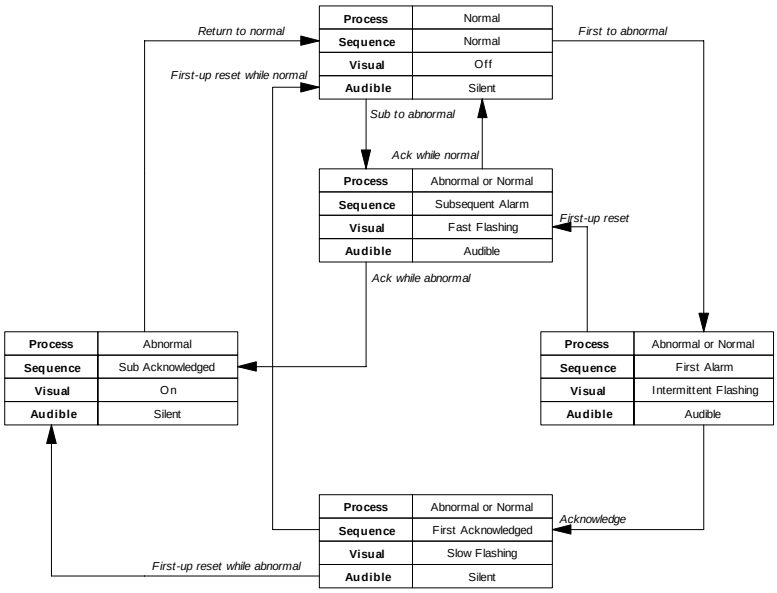
Manual Reset First-up (Sequence F2M-1) with no subsequent alarm flashing and silence pushbutton



Sequence features

1 Mute, acknowledge reset and lamp test pushbuttons required
2 Alarm audible device
3 Lock-in of momentary first alarm until acknowledged.
4 Silence pushbutton to silence the audible device while retaining first-up flashing indication
5 Flashing indication for first alarm only. New subsequent alarms have the same visual as acknowledged alarms
6 First-up indication is reset and the audible devices silenced when acknowledged
7 Manual reset of acknowledged alarms after process conditions return to normal

Automatic Reset First-up (Sequence F3A) with first-up flashing and "first-up reset" pushbutton



Sequence features

1 Acknowledge, first-up reset and lamp test pushbuttons required
2 Alarm audible device
3 Lock-in of momentary first alarm until acknowledged.
4 First-up flashing different from subsequent flashing.
5 First-up reset pushbutton to change the first-up visual indication to be the same as subsequent visual indication.
6 Automatic reset of acknowledged alarms when process conditions return to normal

7. Options

Status Display Board

The Series 625 Status Display Board option was introduced as a low priced alternative to the standard Active Alarm Board for applications requiring only non-latching lamp indication.
This board is compatible with the Series 625 Alarm Annunciator System so that boards may be added or changed at a later date. Status Display Boards can be incorporated in a standard annunciator if some inputs require status-only display. This board includes the Lamp Test facility. Input contacts do not carry the full lamp load.

Facilities

Normally open or normally closed contacts may initiate the "Lamp On" condition, the selection being made by means of a 2 way DIL switch located on the Status Display Board. Each channel may be individually selected.
This board can also drive repeat relays mounted on the Relay Terminal Board, the relays following the initiating contact. Relay operation can be selected as normally energised or normally de-energised. (see Operating Instructions, Page 31).
The Status Display Board does not activate the integral horn or the horn relay.

Lamp Test

On pressing the Lamp Test pushbutton, the lamps will be illuminated whether normally open or normally closed contacts are selected.

Protection

In the event of the lamps becoming short-circuited (for a limited period), the Status Display Board will protect itself from excessive current flow. Unlike the Active Alarm Board, no indication of short or open circuit lamps is given.

Lamp-Only Board

The lamp-only board option provides an inexpensive indicator-only display which can be assembled using the same bezel and frame assembly. This lamp-only display fascia can be used with PLC systems or remote logic annunciators. Contacts must close to illuminate lamps. A Lamp Test facility can be provided externally but no protection is included against short circuit lamps. Input contacts carry the full lamp load.

LED Version

The Series 625 Alarm Annunciator can also be supplied with plug-in LED assemblies in place of the standard incandescent lamps. An LED assembly of the correct colour must always be used to match the alarm window filter colour.
All colours are available except blue.

8. Specification

INPUTS (ALL OPTO-COUPLED)

CONTACT	Volt-free contacts either normally open or normally closed. (Selectable by means of on-board DIL switch)
VOLTAGE	Standard voltage input 19-30VDC. Can be specified on order to operate from 5V min to 50V max with common OV.
CONTACT RESISTANCE N/C CONTACT RESISTANCE N/O	Series resistance of contact cables 5kΩ maximum. Parallel resistance of contact cables 150kΩ minimum.
INPUT TRANSIENT FILTER	Signals narrower than approx. 40ms at 30V will not trigger the annunciator.
SURGE WITHSTAND TRANSIENT	To IEC 255.4 1.2/50mS Common mode: 1kV Series mode: 2kV
INPUT PROTECTION	The equipment is protected against reverse connection of the power supply. Alarm inputs are protected against accidental connection to mains voltages (240VAC, 50Hz)or a 1000V Megger test
FIRST-UP DISCRIMINATION	10ms ±5ms

OUTPUTS

VISUAL	Back illumination of each alarm window by two filament lamp or plug-in LED assemblies.
AUDIBLE	Internal audible device emits high pitched tone of approximately 3.5kHz 87db (A) with a 24V supply at 1 metre distance. A Horn Relay is provided on each terminal board to drive larger, external horns or sirens.
RELAYS	Each alarm way is capable of driving a relay. Relays fitted on the Relay and Input Terminal Board are 24VDC nominal. Contact rating: 3A, 30VDC or 3A, 240VAC resistive. Relay outputs may be normally energised and de-energise on fault, or vice-versa. (See Operating Instructions, Page 29.)
LAMP MONITOR	A "fault" LED in the pushbutton module pulses on and off if an alarm way is unable to light its lamps due to a short circuit lamp or both lamps being open circuit. Whenever any pushbutton is pressed this LED lights, giving positive indication that the pushbutton contacts have been made correctly.

PUSHBUTTONS

LAMP TEST	Lights all lamps while pushbutton is pressed, irrespective of alarm status.
ACKNOWLEDGE	Causes flashing lamps to change to a steady state and cancels the audible.
RESET	Resets the annunciator if it has been acknowledged and the contacts have cleared.
SYSTEM TEST	Sets all alarm ways to simulate an alarm condition at the inputs Alarm cards set as status ways or non-latched will remain on whilst the button is pressed.
MUTE	Cancels the audible alarm only.
FIRST-UP RESET	Changes the first-up alarm to a subsequent alarm

GENERAL

SUPPLY VOLTAGE	24VDC nominal (19-30VDC)
SUPPLY CURRENT	Quiescent: 7mA Lamps on: +80mA } Typical per alarm card Relays fitted: +17mA Internal horn: +30mA } Typical per system Pushbutton module: +10mA
FUSE RATING	500mA/T 20x5mm This fuse protects the signal voltage fed to the external alarm contacts
SUITABLE POWER SUPPLIES	24V 0.7A will drive up to 8 standard alarm ways 24V 1.3A will drive up to 15 standard alarm ways 24V 2.5A will drive up to 28 standard alarm ways 24V 5.0A will drive up to 56 standard alarm ways 24V 10A will drive up to 115 standard alarm ways
TERMINALS	Rising clamp type terminals. Maximum cable size 2.5mm^2
EMC COMPLIANCE	Immunity to EN50082-2:1995 Emissions to EN50081-2:1994
TEMPERATURE RANGE	OPERATING -10°C to 60°C STORAGE -20°C to 80°C
HUMIDITY	0-95% RH, non condensing
PROTECTION	IP41
LAMPS	28V 1.1 watt Glass wedge. 14,000 hours typical life

9. Installation

Panel cut-out

Only one cut-out is required to mount the alarm annunciator. The size of this cut-out is determined by subtracting 19mm from each of the overall panel height and width dimensions, with a 3mm tolerance in either direction. For standard units a depth of 120mm is required at the back of the panel. For certain options this depth will need to be slightly larger (please consult sales office).

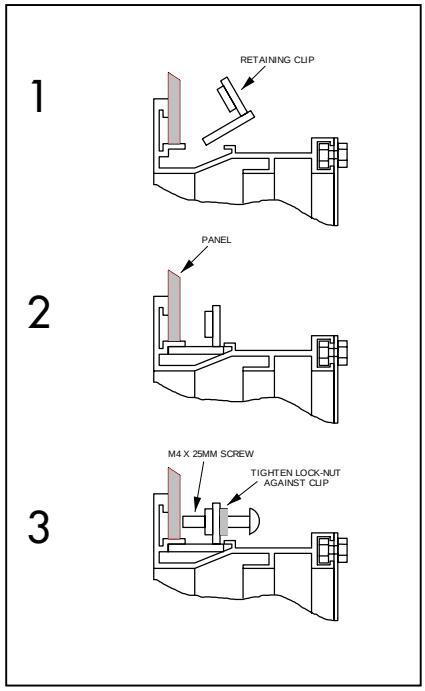
The table below shows both overall panel size and cut-out for various configurations within a 10 x 10 matrix.

Annunciator size				Panel cut-out	
Ways vertically	Height (mm)	Ways horizontally	Width (mm)	Height (mm)	Width (mm)
1	90	-	-	71	-
2	140	2	140	121	121
3	190	-	-	171	-
4	240	4	240	221	221
5	290	-	-	271	-
6	340	6	340	321	321
7	390	-	-	371	-
8	440	8	440	421	421
9	490	-	-	471	-
10	540	10	540	521	521

Fixing system into panel cut-out

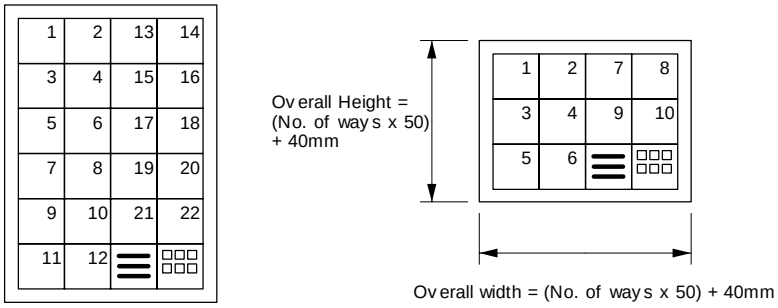
The annunciator system as received will be ready to install into the panel cut-out. It is passed through the cut-out as far as the 'picture frame' trim and is secured from behind with retaining clips and screws shown in the drawing opposite. Sufficient clips and screws are provided to permit them to be used approximately every 150mm around the perimeter of the frame. To ensure the screw cannot shake loose a locking nut is provided.

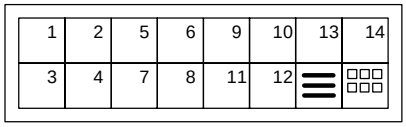
Maximum panel thickness 4mm



Numbering System

For ease of wiring and configuring of the required sequences and legends, the following numbering method should be used. Note that the numbering system uses vertical columns of 2. All the alarm inputs on the rear terminals use this numbering system to designate each alarm window.





Panel cutout = overall dimension less 19mm (tolerance ±3mm)

Connection details

At the rear of the annunciator are located the Terminal Boards used to connect to the alarm contacts and output relays. These boards will also connect to the factory fitted bus wiring which will interconnect all the alarm modules. The annunciator should be wired as shown on either page 26 or page 28 depending on whether an Input Terminal Board or a Relay Terminal Board is fitted.
The Input Terminal Board is used for systems with 2 output relays or less, the Relay Terminal Board is used for systems having a larger number of standard repeat relay outputs.
In general when only one terminal board is required, this will be positioned at the lower left of the back panel when viewed from behind.

The numbers in the input terminals relate to window positions as shown in the numbering system above.

All terminals are of the rising clamp type and are suitable for cable of up to 2.5mm^2

Power Supply Connections

RTK Series 625 Annunciators are 24VDC powered. A suitable power supply should be selected which is capable of handling the surge current of all lamps coming on simultaneously (i.e. Lamp Test). The power supply connections are made to terminals 0V and V+.

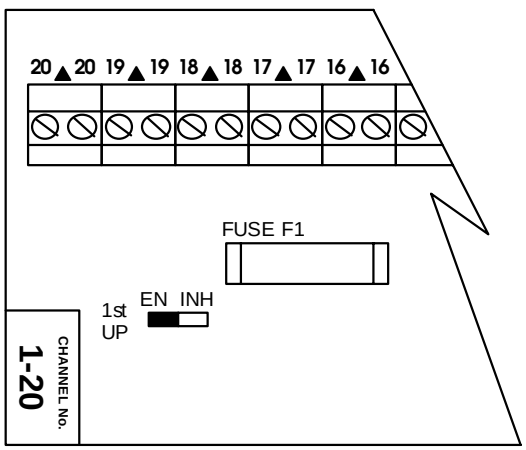
On larger annunciators where two or more Terminal Boards are used the power supply should be connected to the first board (i.e. that board which connects to the first alarm ways). The positive and the OV lines on each terminal board are interconnected (pre-wired at the factory) so the customer simply makes one connection to the two unused terminals on the first terminal board marked +V and 0V. Power supply cable should have a minimum rating of 90mA per channel for standard annunciators and 115mA per channel for annunciators fitted with repeat relays.

Earth Connection

All Series 625 Alarm Annunciators are fitted with a separate earth stud which is situated on the bottom right hand edge when viewed from the rear. To ensure the final installation meets all relevant safety and EMC directives this earth MUST be connected.

Systems larger than 20 alarm ways

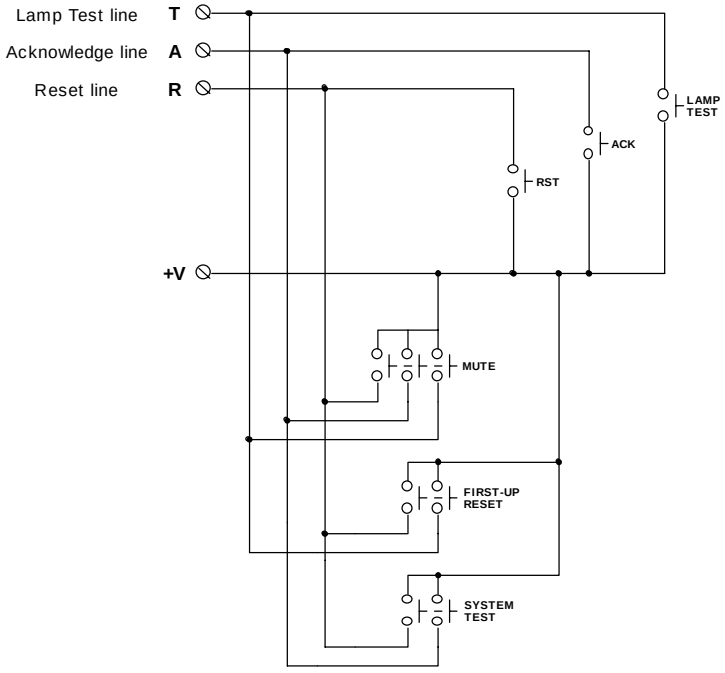
Because of the modular nature of the P625 Annunciator, the Terminal Boards are manufactured in 6 way, 12 way and 20 way versions to cater for all the different annunciator sizes. On systems which have more than 20 alarm points, multiple Terminal Boards are used. In these cases, each of the Terminal Boards will be marked with the channel numbers to which they refer (see diagram below and numbering system above).
For example, on a 40 way Alarm Annunciator, two 20 way Terminal Boards will be fitted, each board being exactly the same with the input terminals marked 1-20. However the 'Channel Number' box will indicate which alarm channels the terminals relate to i.e. the first board will be 1-20 and the second 21-40.



Remote Pushbutton connection

When it is required to mount the pushbuttons remotely from the annunciator, connections should be made to the terminal board as shown below.
Remote pushbuttons are normally open. Switches of almost any type can be used - these do not require "pull up" resistors. The +V connection must be made to the system supply.
MUTE, FIRST-UP RESET, SYSTEM TEST functions are also available using multipole pushbuttons as shown.
As with the alarm contact inputs, it is recommended that if long runs through an electrically noisy environment are envisaged, a screened cable is used with the screen connected to earth at one end only.

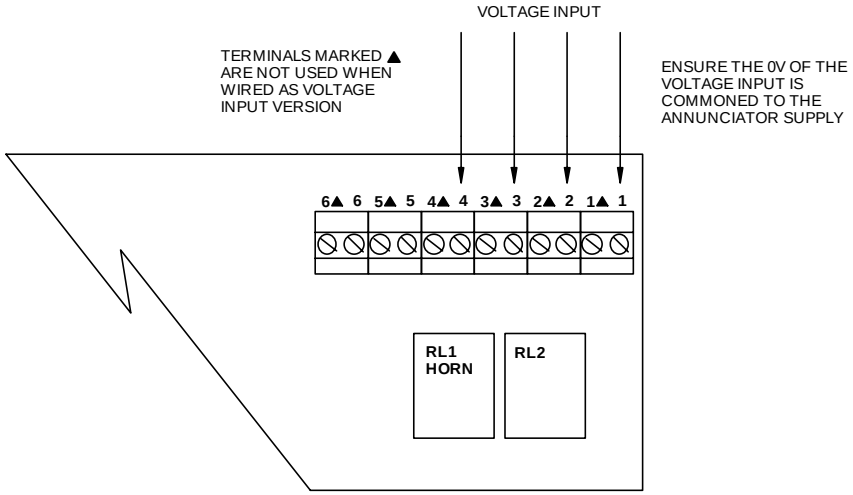
Please Note:- It is only necessary to connect the external pushbuttons to one of the terminal boards. As these boards are all commoned together by the factory bus wiring any board can be used.



Systems with voltage inputs

The alarm inputs to the P625 Annunciator system are normally volt-free contacts with the contacts been wetted by the 24VDC system voltage.
If required, the standard unit can be configured as a 24VDC voltage input version, the alarm inputs being wired up as shown in the diagram below.
If specified at the time of ordering the field contact voltage input can be either 48VDC or 125VDC. These higher DC voltages are connected in exactly the same way as the 24VDC version.
Ensure that the alarm input voltage and the annunciator supply have a common 0V.

Another possible option is to have a 110VAC field contact voltage. When using 110VAC the neutral is connected to the common terminal, (marked with a triangle) and the live is connected to the input terminals (numbered 1 to 20)


VOLTAGE INPUT
TERMINALS MARKED ▲ ARE NOT USED WHEN WIRED AS VOLTAGE INPUT VERSION
ENSURE THE 0V OF THE VOLTAGE INPUT IS COMMONED TO THE ANNUNCIATOR SUPPLY
6▲ 6 5▲ 5 4▲ 4 3▲ 3 2▲ 2 1▲ 1
RL1 HORN
RL2

Annunciator interconnection

It is possible to expand an existing Annunciator by the addition of further Annunciator panels. These are interconnected by ribbon cable and hence operate as a single system using the same pushbuttons and audible.
If the Annunciator is ordered as an expansion unit, it will be supplied with a length of 8 way expansion ribbon cable (specify length when ordering).
This ribbon cable is plugged into the 8 way expansion plug on the Terminal Board of each of the units to be part of the same system (see diagrams Page 26 and 28).
As the cable socket is fitted with polarising pins, it will be necessary to snip off the two pins marked V+ and 0V on the right hand side of the plug.
Each of the interconnected Annunciators must have separate power cables to supply the 24VDC.

10. Operating Instructions

GENERAL

There are two types of terminal assemblies available, the choice being dictated by the number of output relays required.

When multiple terminal boards of either type are used with a system requiring remote pushbuttons, it is necessary to make connections from the pushbuttons to one input board only, as the cable-bus makes the interboard connections.

Input Terminal Board

If a maximum of two relays are required for a system, usually one for an audible repeater and one for a grouped output, then the Input Terminal Board is used. This is available in 6, 12 and 20 ways and has 2 screw terminals for each alarm contact input and a further five terminals for power supply and remote pushbutton connection. Provision is made for two relays, one for driving a high power audible device and the other for connection as a group relay either for an individual alarm or for a group of alarms. Each relay has three screw terminals available for connection: common, normally open and normally closed contacts.

Using the group relay on the Input Terminal Board

The group relay coil connection is terminated at a pin marked 'G1' on the header on the left edge of the board. From here it is connected to the drive output of any one alarm way or group of alarm ways. This connection is usually made at the factory because of the special crimp connections required for the flying leads. When used as a group relay i.e. for the relay to operate when any one alarm way in the group is activated, the annunciators in that group must all be set to normally de-energised relay drive outputs (see 'DIL Switch settings', Page 29, to check this). The relay drive outputs in this group are then all connected together and taken to the relay coil connection mentioned above.

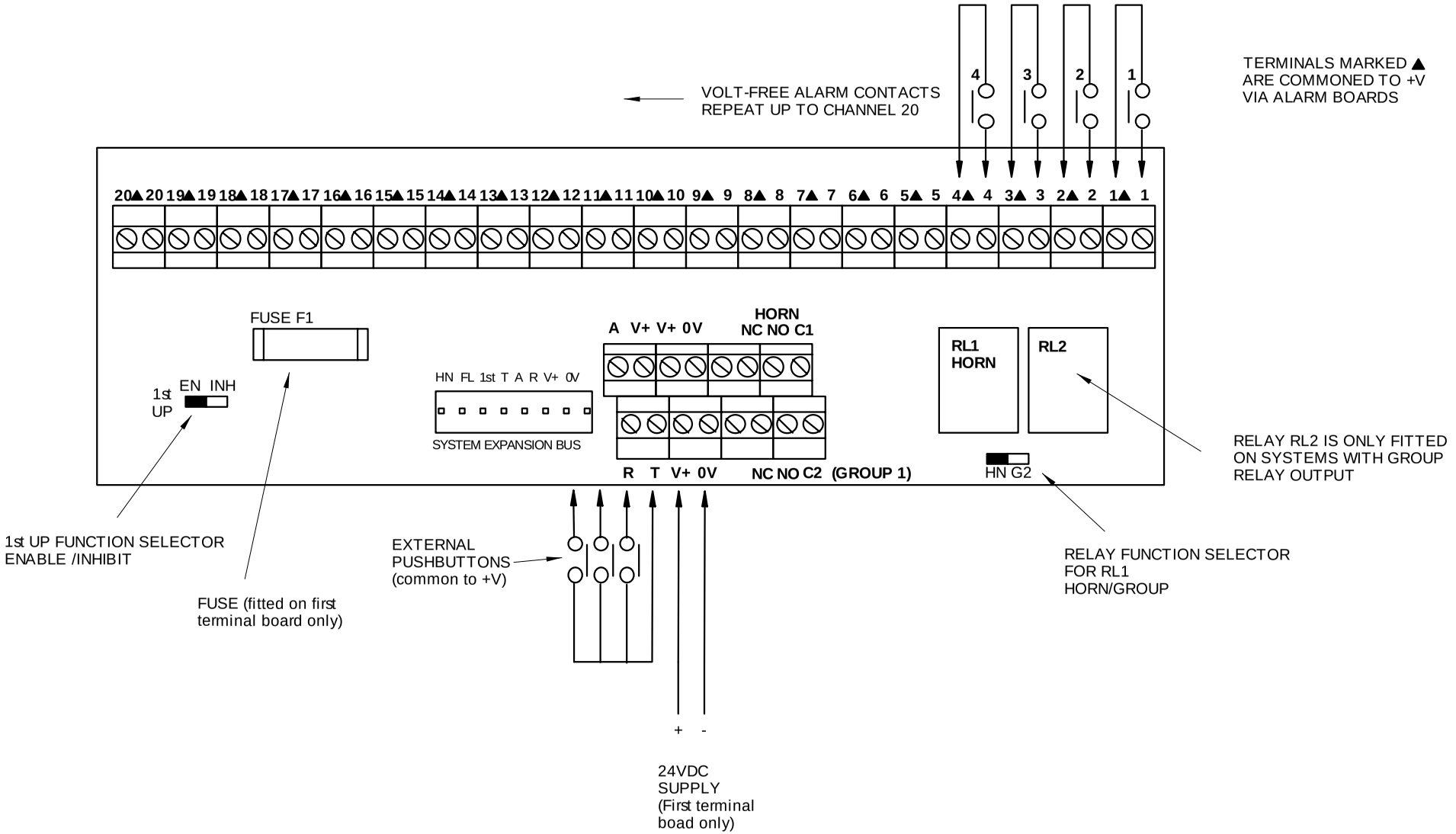
The Group Relay contacts are taken to a screw terminal block for customer connection, giving a single pole change-over connection - see page 26.

If the relay contacts are to be used to switch mains or high voltages, users must note that tracks from the terminals to the relays run on the underside of the board and would, in such circumstances, carry these high voltages.

Using the horn relay

The horn relay is normally linked to the interconnected horn output so that if any alarm should trip, the horn relay will be energised. This link is labelled HN on the Input Terminal Board. If it is required to use this relay as a second group relay, then the link is changed from the HN (Horn) position to G2 (Group2) position to bring the coil connection out on the pin marked 'G2. The relay may now be used in a similar manner to the group1 relay - see text above.

NOTE:- In panels having over 20 alarm ways using two or more terminal boards there will, of course, be another two relays available for each additional 12 or 20 way input terminal board and one additional relay for each 6 way input terminal board.



INPUT TERMINAL BOARD

(20way board illustrated, 6 and 12way boards follow the same format)

The Relay Terminal Board

For installations requiring a larger number of repeat relays than that provided by the Input Terminal Board, a Relay Terminal Board is used - again this is available in 6, 12 and 20 way versions. This assembly is physically larger than the Input Terminal Board and, in addition to two screw terminals per alarm input way and five terminals for power supply and remote pushbutton connections, has three additional terminals for the contacts of each relay (common, normally open and normally closed). Each Relay Terminal Board carries one additional relay to drive remote sirens or horns should these be required.

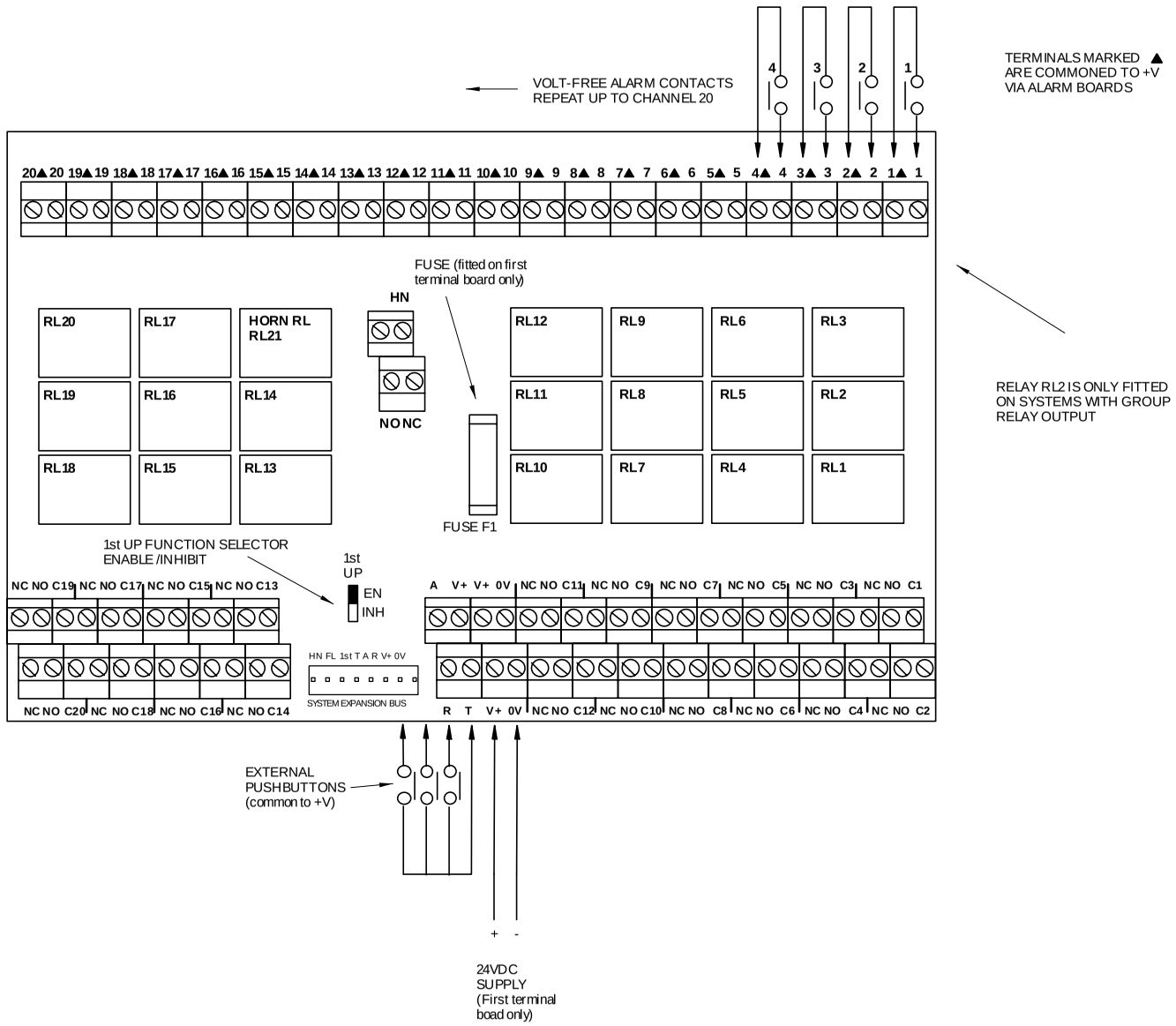
When more than two relays are required per 20 alarm ways, then a Relay Terminal Board is fitted at the rear of the panel in place of the Input Terminal Board.

The Relay Terminal Board fits in the same place as the Input Terminal Board (and is used for up to 20 alarm ways - providing 20 relays and a horn relay), this board occupies approximately twice the area due to the large number of relays and terminals fitted.

Alarm contact inputs follow the top edge of the board and the relay contacts follow the bottom edge in the format as shown on page 28. All the relays on the Relay Terminal Board have a changeover contact set brought out to terminals, namely normally open, normally closed and common, where normal is defined as the de-energised condition for the relay.

The standard mode of operation is for the relay to follow the alarm logic, this means that the relays are triggered when an alarm occurs and does not return to normal until the alarm has been acknowledged and reset. Using the alarm card DIL switches it is possible to change the operation so the repeat relays either follow the alarm contact or follow the display.
Relays can be either energised or de-energised in the non-alarmed condition.
All these relay options are selected by means of the DIL switches on the active alarm board (see DIL Switch Settings, Page 29)

If the relay contacts are to be used to switch mains or high voltages, users must note that tracks from the terminals to the relays run on the underside of the board and would, in such circumstances, carry these high voltages.



RELAY TERMINAL BOARD

(20way board illustrated, 6 and 12way boards follow the same format)

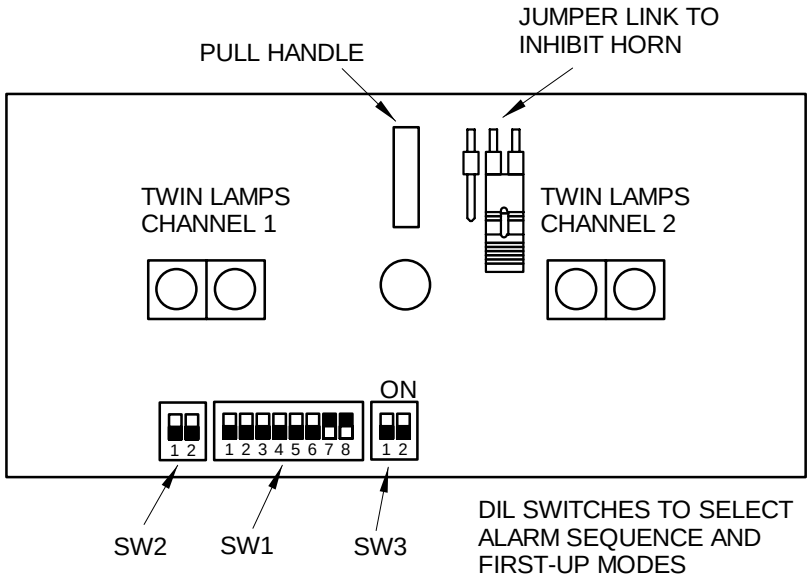
11. DIL Switch Settings

DIL SWITCH SETTINGS

Remove the Front Bezel Assembly as described in the Maintenance Section, Page 33.
Each alarm card has three dual in-line switches which are revealed when the bezel assembly is removed. These are used to select the various options as shown below. For further details on the operation of the alarm sequences refer to the section headed Sequences, Page 11.

WARNING
The DIL switch settings described below will affect both alarm channels controlled by that Two Channel Alarm Card

Active alarm board showing DIL switches



8 way DIL Switch (SW1)

S1	Switch ON to select **Dimback** facility
S2	Switch ON to select **Ringback** facility
S1 & S2	Switch ON both S1 and S2 to select **Reflash** facility
S3	Switch ON to select **2 button operation**
S4	Switch ON to select **Auto Reset** facility
S3 & S4	Switch ON both S3 and S4 to select **Non-latched** facility
S5	Switch ON for normally closed alarm contacts *(i.e. contacts open to alarm)* Switch OFF for normally open alarm contacts *(i.e. contacts close to alarm)*
S6	Switch ON for normally de-energised relay output *(i.e. de-energised in the non-alarm state)* Switch OFF for normally energised relay output *(i.e. energised in the non-alarm state)*
S7	Switch ON to select **Relay follow input** option *(this is only available if the unit has individual repeat relays fitted)*
S8	Switch ON to select **Relay follow display** option *(this is only available if the unit has individual repeat relays fitted)*

2 way DIL Switch (SW2)

The switch is used to select the type of first-up indication required

S1 OFF & S2 OFF	Standard mode F0 selected
S1 ON & S2 OFF	First-up mode F1 selected
S1 OFF & S2 ON	First-up mode F2 selected
S1 ON & S2 ON	First-up mode F3 selected

2 way DIL Switch (SW3)

This switch is used to inhibit two standard features if appropriate for the application

S1 Switch ON to inhibit relay operation on system test

S2 Switch ON to inhibit the first-up facility

DIL Switch settings for commonly used sequences

(The black part indicates the switch i.e. if the black section is up then that switch is ON)

Sequence F0M

All annunciators will be configured in this mode unless requested otherwise

Sequence F0M with No lock-in

Sequence F1A

Sequence F2M

Sequence F2R

Sequence F3A

Sequence F3M

Status only

First-up and standard sequences

First-up sequences are a built-in feature of the Series 625 Alarm Annunciator System. If it is required to inhibit the first-up system, then simply switch S2 on SW3 to the ON position. This feature will need to be selected on each alarm board that requires the first-up inhibiting.

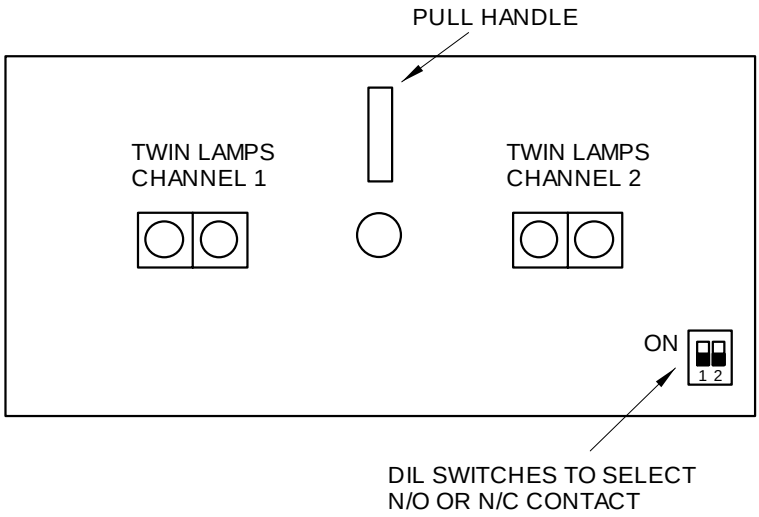
Horn Inhibit

Each two way alarm board can also have the horn inhibited. This selection is by means of a jumper link as shown on these drawing on page 29. Select EN for enable (default position) or INH for to inhibit the horn

STATUS DISPLAY BOARD

The Status Display Board has the facility to accept either normally closed or normally open contacts for indication (see Options, Page 17). This is selectable by DIL switch.
To change the operation of this board, remove the front bezel assembly as described in the Maintenance Section, page 33. This reveals the 2way DIL switch on each Status Display Board as shown below.

Status display board showing DIL switch



Channel 1

Normally closed contacts (open to illuminate the window)	S1 - ON
Normally open contacts (close to illuminate the window)	S1 - OFF

Channel 2

Normally closed contacts (open to illuminate the window)	S2 - ON
Normally open contacts (close to illuminate the window)	S2 - OFF

Repeat Relays

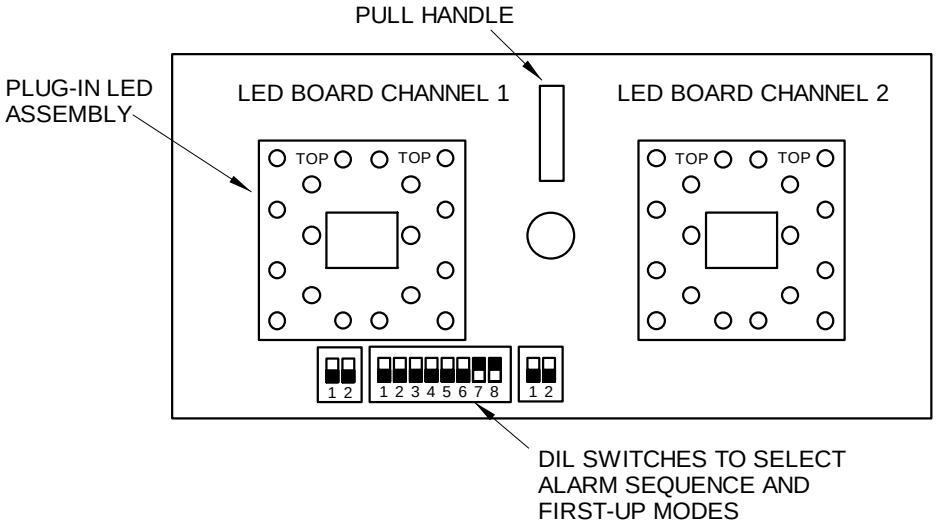
The Status Display Board can also drive repeat relays mounted on the Relay Terminal Board. The mode of operation can be configured as normally energised or normally de-energised. To change this mode of operation then simply remove the Status Display Board and move the jumper links on the rear to position EN for energised and position DE for de-energised. LK1 will configure channel 1 and LK2 will configure channel 2.

Plug-in LED Assemblies

To obtain a virtually maintenance free alarm system the Series 625 Annunciator is available with the standard incandescent lamps replaced with ultra-bright plug-in LED assemblies. These LED assemblies are supplied in different colours to suit the colour of the alarm window. Colours available are red, amber, yellow, white and green.

If it is necessary to change the position of one of these LED assemblies then simply remove the front bezel assembly as described in the Maintenance section, Page 33, and unplug the white LED board. When this is replaced in the new position care must be taken to ensure the board is plugged in the correct way up. Each board is marked "TOP" to indicate the top edge. This is illustrated in the diagram below.

Active alarm board showing plug-in LED Assemblies



12. Maintenance

No special tools required
All maintenance is achieved from the front of the annunciator without the use of special tools. For lamp replacement and changes to the mode of operation, only the front bezel needs to be removed. Each bezel surrounds two windows.

Bezel removal
Located between the two windows of each bezel is a pull handle which normally protrudes by two or three millimetres from the front of the bezel. This is eased out with fingertips to approximately 12mm to allow a firmer grip. When pulled, the front bezel will 'snap' loose and can then be pulled free of the annunciator panel, exposing the circuit board and lamps.

Engraved filter replacement
Remove the bezel assembly as explained above. The two screws on the rear of the module are removed which allows the assembly to be dismantled.

Circuit board removal
In the event of alarm board failure, the circuit board is easily removed for repair or replacement. The pull-handle, see diagram on page 29, is gripped and pulled forwards to gently ease the circuit board from the bulkhead connectors. Replacement is the reverse of removal, note that care must be exercised when replacing the board to ensure that the male pins from the bulkhead connectors locate properly into the circuit board connectors. Once this is done, the board should be pressed firmly home.

Before a circuit board is removed or replaced the power to the annunciator should be turned off.

Lamp replacement
Once the bezel assembly has been removed, as described above, simply grip the lamp with the fingers and pull firmly away from the board. Replace by reversing the procedure, taking care that the wedge base is correctly located in the socket before pressing home.

Fuse replacement
The first Terminal/Relay Board on each annunciator contains a single fuse which is used to protect the signal voltage fed to the external alarm contacts. If this blows for any reason it should only be replaced with a fuse of the exactly the same specification.
500mA/T Anti-surge 20 x 5mm

13. Engraving

Legends are engraved on a diffuser of the required colour using "condensed" letter style. A clear thin protective film is fitted in front of each filter to protect the engraving.
Colours available are Red, Amber, Yellow, Green, White and Blue.
For the best aesthetic appearance, it is recommended that generally all filters on an annunciator are engraved with the same size.
Unless requested otherwise the text is always engraved centrally to the filter.

7MM STYLE 3 LINES

7mm character height

5MM STYLE UP TO 4 LINES AT 9 CHARACTER

5mm character height

3.5MM STYLE UP TO 5 LINES WITH UP TO 14 CHARACTERS PER LINE AVAILABLE

3.5mm character height

SIZE	1 LINE	2 LINES	3 LINES	4 LINES	5 LINES
3: (7mm high)	7 characters per line				
4: (5mm high)	9 characters per line				
6: (3.5mm high)	14 characters per line				

14. Appendix A

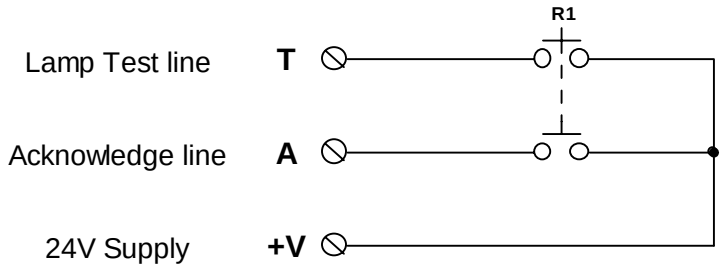
Sleep Mode

In certain circumstances, where alarm equipment may be situated within temporarily unmanned sites, the P625 Alarm Annunciator can be switched into 'sleep mode'.

The sleep mode will disable the horn output and also all the visual indication, whilst still retaining full operation of all the logic functions. Any alarms occurring when the annunciator is in the 'sleep mode' will be latched in as normal and will retain all the first-up alarm indication. The logic circuitry of the annunciator is working in exactly the same as normal , it is simply the lamp and horn drives that are disabled. When the annunciator is returned to the normal operating mode, it will display all the alarms that have occurred whilst in the 'sleep mode'. Any repeat relays from the annunciator that feed remote equipment, such as a telemetry system, will work in the same way as normal, so not affecting remote monitoring of unmanned sites.

The sleep mode will dramatically reduce the current drain as the lamps themselves will take the majority of the current used. This is useful in battery backed systems to extend the possible battery backup time.

To activate the sleep mode it is necessary to simultaneously connect the Lamp Test and Acknowledge lines to +V as shown in the diagram below.
As soon as these two lines are disconnected from +V the annunciator will return to its normal operating state.



WHERE R1 IS AN EXTERNAL RELAY CONTACT

15. Appendix B

Horn Inhibit

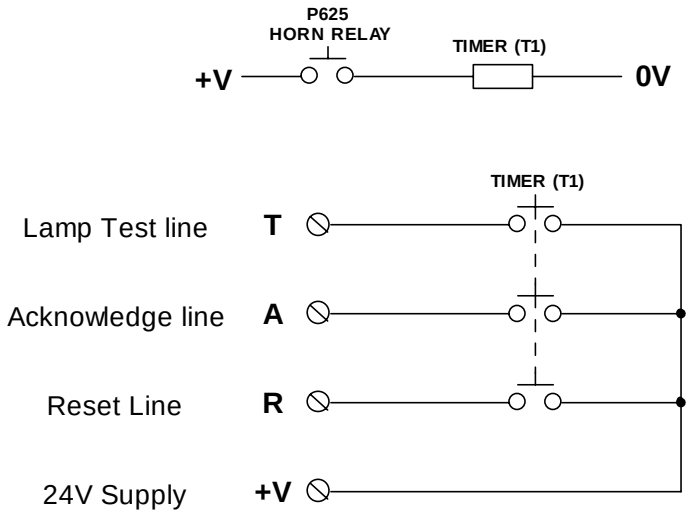
The Horn Inhibit is an optional feature which is offered with the P625 Alarm annunciator.
With this option the horn bus-wiring is bought out to a pair of terminals for external connection. Simply connect the two terminals together to maintain the horn. If the horn needs to be disabled then open the connection between the two terminals. The terminals are marked 'HORN INHIBIT'.
Breaking this connection will disable both the integral audible and any external audible driven via the horn relay.

16. Appendix C

Automatic Mute after time delay

The P625 can be supplied with a remote timer to give an automatic mute after an adjustable time delay. The time period is started when the horn comes in and when the time delay has elapsed the contacts will all close. The action of taking the Test, Acknowledge and Reset lines high simultaneously will give a MUTE function.

The external timer should be wired as shown in the diagram below



WHERE TIMER (T1) IS AN EXTERNAL
3 POLE TIMER

17. Other RTK Products

RTK Engineering produce a range of complementary products for many applications in the Industrial Control and Instrumentation field, as listed below. All standard products come complete with a **5 year guarantee** from this ISO9001:1994 approved company:

Programmable Remote Logic Alarm Systems
Hazardous Area Alarm Systems
Mimic Display Panels
Trip Amplifiers
Trip Monitoring Systems
Signal Isolators
Multi-output Isolators
Signal Converters
Frequency Converters
Tachometers and Inverse Tachometers
Universal Panel Meters
Large Character Displays
Power Supplies
Loop Powered Isolators and Displays
Intrinsically safe alarm and status display products including:-
- Xenon Beacons
- Sounders
- LED Clusters

Please ring the sales office to obtain our latest product guide